1 U. S.

DECEMBER 1966
VOL. 32 NO. 5

Soil Conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES

SERIALS
JAN 3 1967
MICHIGAN STATE UNIVERSITY
LIBRARY

WATER MANAGEMENT

River Basin Plans
Page 102

Landforming for Water Control
Page 105

Forecasting the Supply
Page 107

Farm Drainage
Page 111

Rio Grande Resource Project
Page 99

SOIL CONSERVATION SERVICE U. S. DEPARTMENT OF AGRICULTURE

Soil Conservation

Devoted to the wise use of land and water resources

DECEMBER 1966 **VOL. 32, NO. 5**

Control . . .

Water conservation, as the Administrator emphasizes this month (p. 119), is a matter of managing the available supply to meet peoples' needs.

Management requires means of controlling the distribution and movement of water. SCS is deeply engaged in helping landowners and local communities plan and install measures for water control.

The structures themselves — dams, diversions, drainage ditches, irrigation systems—are not conservation measures *per se*. It is how they are used, and to what purpose, that determines whether the result is conservation or waste.

Farm drainage is a case in point, as Associate Administrator Gladwin Young points out (p. 111).

Precision: The more precise the water-control system installed, and the more skillful its use, the more efficient the resulting water management. Louisiana Conservation Engineer K. V. Stewart, Jr., illustrates with examples (p. 105) of landforming that permits removal of water at one season and adding it as needed at another.

Framework: Water management can miss its mark, however, if objectives have not been clearly defined. New guides are emerging from river basin studies that begin with framework plans then pursue special problems within that framework. Eugene Buie explains (p. 102) the system of surveys that now involves three-fourths of our mainland area.

COVER: Snow in the high mountains of the Rocky Mountain National Park, as throughout the West, is under constant watch by SCS to enable forecasters to anticipate the summer water supply in valleys below.

99 Northern Rio Grande RC&D Project
Resource plan starts economic improvement
By Vincent W. Shally

102 River Basin Surveys
Data from framework and detailed studies already shaping plans
By Eugene C. Buie

105 Improved Land Grading Gives Complete Water Control
By K. V. Stewart, Jr.

107 Electronic Methods of Snow Surveying
By William G. Shannon

110 Camping-Fishing Area Solves Trespass Problem

111 What About Farm Drainage?
By Gladwin E. Young

113 "Grass Gages" Give Ranchers Clues to Proper Grazing

114 Eight More RC&D Projects Approved

116 Conservation Profile
Ray Hecksel, Minnesota

118 Review
Notes on Western Range Forbs, Cruciferae through Compositae; New Publications

119 From the Administrator
Water Conservation and Management

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published monthly by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Budget July 25, 1963.

ORVILLE L. FREEMAN — Secretary of Agriculture
JOHN A. BAKER — Assistant Secretary of Agriculture
DONALD A. WILLIAMS — Administrator, Soil Conservation Service

Prepared in the Division of Information, Soil Conservation Service,
U. S. Department of Agriculture, Washington, D. C. 20250

BEN O. OSBORN, Editor — GEORGIE A. KELLER, Production Editor

Reprint permission: Contents of this magazine may be reprinted without special permission. Credit is not required but is appreciated. Photos available on request.

Commercial names: Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscription: $1.75 per year, $2.50 foreign. Single copy, 15 cents. Discount of 25 percent on orders of 100 or more sent to same address. Order direct from Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

Resource plan starts economic improvement

Northern Rio Grande RC&D Project

HOW A RESOURCE conservation and development plan can galvanize local people and government agencies into action for the mutual goal of economic betterment is being demonstrated in the Northern Rio Grande Resource Conservation and Development Project (RC&D) in north-central New Mexico.

In just 2 years the 25 sponsors have set in motion project measures that created 35,000 man-days of employment and brought $398,000 of additional income to the 4-county area in 1965.

The project sponsors have received 162 proposals for such measures as marketing and processing facilities, income-producing recreation enterprises, flood-control and watershed-protection projects, community irrigation improvements, municipal recreation developments, access roads, expansion of native arts and crafts industries, beautification of highways, and many others.

These proposals are submitted by the local people who propose to carry out their own projects with their own funds and facilities and with the technical, financial, and long-term credit assistance from all available sources.

The sponsors who prepared the overall plans and coordinate the activities include the State of New Mexico, the counties of Taos, Rio Arriba, Santa Fe, and Los Alamos, the municipalities of Santa Fe, Espanola, and Taos. four RAD associations, seven State agencies and commissions, the Northern Indian Pueblos Association, and five soil and water conservation districts.

Assisting the sponsors in the development and implementation of their work plan are a large number of local, State, and Federal agencies.

The basic project work plan was prepared in 1964, and the Secretary of Agriculture in October authorized Federal assistance in putting it into operation.

The status of the 162 project measures approved by the steering committee to date is as follows:

Sixty-seven groups have been assisted in developing their plans and have either completed construction or have construction underway.

Seventy groups are being assisted in the preparation of their plans.

Twenty of the groups are pending the programing of assistance for planning their proposed activities. Some preliminary planning has been done on a number of these.

Five are of long-range nature. Some require new legislative authority or changes in the present laws and regulations. The agencies and organizations involved have been contacted for their guidance and assistance in implementing these projects.

An estimate of costs and returns of the measures completed or near-

By Vincent W. Shally
Assistant State Conservationist, SCS, Albuquerque, N. Mex.

The RC&D project will develop markets for specialty products, such as Spanish foods baked in these adobe ovens (ornos) in Espanola.

ing completion indicates that they have cost about $1,675,000. The local participating groups have expended more than $1,300,000; cost-sharing and loan funds make up the balance. The estimates indicate that these completed projects will mean more than 400 additional man-years of employment in the area.

Among the project measures scheduled for completion in the immediate future is the Duke City Lumber Production Mill at Espanola, which initially will provide employment for a minimum of 35 men at the mill plus an additional 100 or more for logging operations. The mill is tentatively scheduled to begin operations the early part of 1967. A substantial weekly income and full use of the timber resources will result in the project area.

Another project measure now underway is the Rancho de Chimayo recreation facility involving the conversion of a small farm to an income-producing recreation facility. When fully developed, this enterprise will create an average of 30 or more man-years of employment and bring an estimated $100,000 additional income annually to the village of Chimayo.

The Sebastian - Martin - Black Mesa Watershed Project is being planned under Public Law 566. By reducing flood damage to crops and irrigation systems, it will enable farmers to invest in the production of higher-income specialty crops, such as chile, cucumbers, and orchard fruits.

With financial assistance from RC&D funds, the town of Taos will be protected by a flood-control dam to be constructed above the town. When completed it is expected to eliminate one of the most obvious deterrents to the economic growth of Taos.

An ambitious plan to publicize the recreation facilities and potentials of northern New Mexico has been undertaken by the project sponsors. Included will be brochures, pamphlets, and information guides. Information for use in travel sections and vacation editions of newspapers are planned.

Basic to the success of the project have been the cooperative efforts and contributions of local, State, and Federal agencies and organizations. Here are some examples of how agencies are helping:

Museum of New Mexico has assisted with inventory and selection of sites for development as historic sites.

State Engineer Office has encumbered or paid cost-share grants totaling nearly $42,000 to 22 community irrigation ditch groups in the project area. These funds were made available by the New Mexico Legislature for community ditch improvements.

State Department of Forestry has assigned a marketing and utilization specialist to assist with forestry project measures and leadership on forestry problems in the project area. The department is using matching RC&D funds.

New Mexico Department of Game and Fish has planted nearly 1¼-million fish in streams within the project area. This is one-fifth of the statewide trout plantings.

New Mexico Highway Department has completed construction on 55 miles of highway at a cost of more than $8 million. This includes the spectacular Rio Grande Gorge Bridge near Taos which opens hitherto inaccessible recreation areas to tourists.

State Parks and Recreation Department has continued development of State parks in the project area, including the purchase of an

Modern concrete linings for irrigation ditches are replacing old systems (right) that wasted much of the precious water on which New Mexico farmers depend.

additional 537 acres from the Bureau of Land Management for development of public recreational sites in the Rio Grande Gorge State Park.

State Soil Conservation Committee has provided overall leadership in soil and water and other resource conservation and development work. The chairman is also a member of the project sponsors' steering committee.

State Department of Development is providing assistance on individual projects involving industrial developments.

State Division of Economic Opportunity has coordinated the programs under the Economic Opportunity Act, including Neighborhood Youth Corps, Community Action programs, Headstart, Adult Basic Education, and Work Experience programs.

Soil Conservation Service is assigned administrative responsibility and leadership by the Secretary of Agriculture in assisting the sponsors plan and carry out the project action plan. It has provided the technical assistance to groups and individuals in the detailed planning and implementation of many of the project measures.

Extension Service has carried on intensive education programs among leaders and farmers in soil and water conservation and marketing and processing of agricultural products.

Economic Research Service has assisted in evaluating the economic feasibility of project measures and their impact on the project area.

Farmers Home Administration processed 307 loans totaling $987,430 during 1965. This is a 150 percent increase from the number of loans on record January 1.

Agricultural Stabilization and Conservation Service has contributed to the conservation and development of water resources, one of the chief aims of the project, through its ACP special projects. In the RC&D area 28 project measures with an estimated cost of more than $364,000 are underway.

Forest Service has carried out extensive developments on range, recreation, wildlife, and road and trail development as part of its regular activities. It has provided assistance on timber utilization project measures, such as the "Duke City" project scheduled for operation in 1967. With RC&D funds this agency and the University of New Mexico are conducting a study of the feasibility of pulpwood production in the project.

Bureau of Indian Affairs has reported impressive accomplishments by Indian pueblos on RC&D project measures. These include roads to recreation areas, range and irrigation improvements, historical site development, and watershed-protection projects.

Bureau of Land Management reports considerable range-improvement work since the project was authorized for operation. A great deal of this was done in cooperation with local soil and water conservation districts.

Soil and water conservation districts have provided leadership and coordination of activities in planning and promoting the project. Five districts are among the formal sponsors of the project: Taos, Espanola Valley, Abiquiu-Vallecitos, Pojoaque-Santa Cruz, and Santa Fe-Sandoval.

The leadership and cooperation developed through the RC&D approach is noted by the local people and visitors alike. This development of leadership and cooperation is in itself one of the most outstanding accomplishments of the Northern Rio Grande RC&D Project. ♦

A makeshift diversion dam made of old car bodies and brush is typical of many antiquated dams to be replaced by well-engineered diversions and ditches in the RC&D project.

River Basin Surveys

Data from framework and detailed studies are already shaping local water plans

By Eugene C. Buie
Director, River Basins Division, SCS

COMPREHENSIVE river basin investigations are now underway in every one of the 48 States and cover about 75 percent of the Nation's contiguous land area. Forty-three separate surveys are in progress.

Although none of the "framework" or "detailed" studies carried out under the coordination of the Water Resources Council has been completed, their findings are already being put to good use in many places.

In the Ohio River Basin, for example, the framework study underway there has identified 12 tributaries within which watershed projects under Public Law 566 can make significant contributions to meeting the total water needs of the region. The studies indicate where the relationships of these projects with other potential developments are sufficiently complex to call for more detailed investigations.

The Ohio River Basin investigation is scheduled for completion in July 1967.

Wabash findings

In the Wabash River Basin, the comprehensive detailed investigation has identified tributary areas where both upstream and downstream works of improvement are needed for complete development. It also has found other areas where both upstream and downstream works are feasible but the two types are completely competitive; only one or the other can be installed. The investigation will supply the facts on which the appropriate decision makers can choose the course that most adequately meets their objectives.

Such information also provides the State agency with data it needs to establish priorities for planning Public Law 566 watershed projects.

Types of studies

The Soil Conservation Service participates in four types of river basin investigations under the provisions of Public Law 566:

(1) Interdepartmentally coordinated comprehensive *framework* studies (type I).

(2) Interdepartmentally coordinated comprehensive *detailed* studies (type II).

(3) Specific *project* studies (type III).

(4) *Cooperative* comprehensive studies (type IV).

A comprehensive river basin investigation provides an inventory and analysis of the water and related land-resource problems and needs of a river basin. It also identifies alternative means of solving the problems and meeting the needs.

Information developed by an investigation permits State and local as well as Federal agencies to make rational decisions as to (1) the nature, scope, and type of projects likely to meet the needs of the basin; (2) the relative timing of the projects in the best interests of all the people of the basin; and (3) the identification of areas that would benefit from specific types of developments.

All the Federal water-resource agencies and the concerned States cooperate in making type I and type II studies, which are carried out under the auspices of the Water Resources Council.

Type III studies are specific project investigations, such as a potential Public Law 566 watershed project or a Corps of Engineers reservoir.

A type IV study is made as a cooperative effort between the Department of Agriculture and a State or another Federal agency.

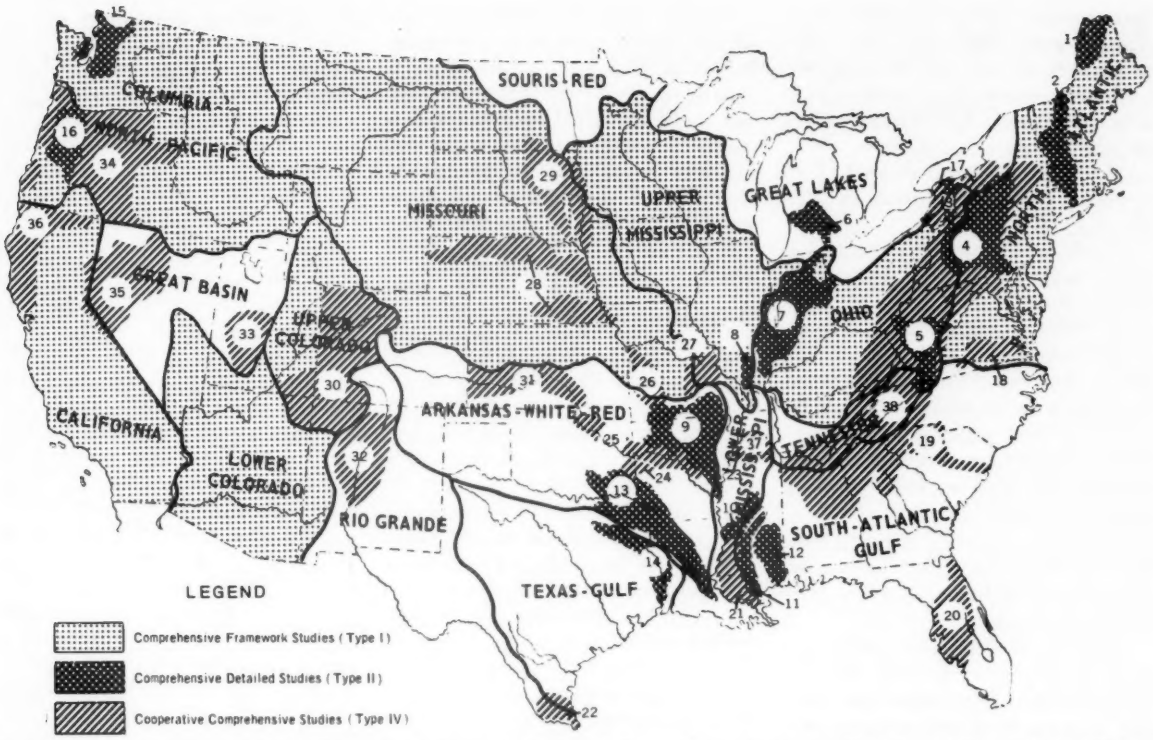
The Water Resources Council was created by the Water Resources Planning Act of 1966. The stated purpose of this law is "to provide for the optimum development of the Nation's natural resources through the coordinated planning of water and related land resources, through the establishment of a water-resources council and river basin commissions, and by providing financial assistance to the States in order to increase State participation in such planning."

The council is composed of the Secretaries of Agriculture; the Army; the Interior; and Health, Education, and Welfare; and the chairman of the Federal Power Commission. The chairman of the Water Resources Council is designated by the President, and currently is the Secretary of the Interior.

In addition to other duties, the council must maintain a study of the relation of river basin plans to the requirements or needs of larger water-resource regions. It establishes principles, standards, and procedures for Federal participation in regional or river basin planning and for the formulation and evaluation of Federal water- and related land-resource projects.

Studies underway

Eight framework (type I) studies are underway. This type of study does not identify specific projects but rather establishes a framework of program and project interrelationships within which individual projects of all local, State, and Federal agencies can be



Forty-three river basin surveys of three types are underway in the United States. Framework surveys (type I) are being made for all the 8 major water-resource regions named on the map. Detailed comprehensive (type II) and cooperative (type IV) surveys are being made in the river basins indicated by numbers as follows:

Type II. Comprehensive Detailed Surveys

1. St. John
3. Genesee
4. Susquehanna
2. Connecticut
5. Kanawha
6. Grand
7. Wabash
8. Big Muddy
9. White
10. Big Black
11. Pearl
12. Pascagoula
13. Red
14. Sabine
15. Puget Sound
16. Willamette

Type IV. Cooperative Surveys With State or Federal Agencies

17. Western New York
18. James River
19. Santee River
20. Florida Rivers
21. Mississippi River Independent Streams
22. Lower Rio Grande
23. Chickasaw
24. Poteau
25. Arkansas Multiple Purpose Project
26. South Grand and Osage
27. Meramac
28. Elkhorn, Big Blue, Niobraba, and Nemaha
29. James and Big Sioux
30. Colorado Rivers
31. Arkansas in Kansas
32. Upper Rio Grande
33. Sevier
34. Oregon Rivers
35. Humboldt-Central Lahontan
36. North Coastal River
37. Hatchie
38. Appalachian Water Resources Survey

carried out in proper relationship to each other.

Where these interrelationships are complex, more detailed comprehensive studies, such as those carried out under type II and type IV procedures, are indicated.

There are 15 comprehensive detailed studies (type II) underway. The main objective of these studies is to identify specific projects within a river basin which should be started within the next 15 years to meet identified needs for water-related goods and services.

Five detailed studies are scheduled for completion by June 1967. Since these studies were started without the benefit of a prior framework study, it has been necessary to carry on the framework study concurrently with the detailed investigations in order that overall economic needs and interrelationships could be established.

Cooperative studies

Twenty cooperative comprehensive studies (type IV) are underway. Sixteen of these are in cooperation with State and local agencies, 3 with the Corps of Engineers, and 1 with both State agencies and the Corps of Engineers.

Generally, these cooperative studies involve specific objectives of the sponsoring organization and of the Department of Agriculture. Usually they concentrate on recognized water-resource problems of the State concerned and analysis of the potentials of Public Law 566 projects to meet identi-

fied needs. They provide local people with essentially the same guidances as do type II studies.

Sixteen cooperative studies have been completed. They have resulted in such improvements as:

(1) More comprehensive and efficient watershed projects in Mississippi;

(2) New soil conservation districts and an RC&D project in Oregon;

(3) The coordination of water-based recreation potentials between upstream and downstream structures in Missouri;

(4) Identification of the interrelationships between potential upstream and downstream projects in North Carolina;

(5) An evaluation of the effects of watershed treatment and management on water supply for irrigation in Nevada.

Each of the completed and going studies is providing local organizations with information for making decisions regarding priorities and scope of upstream development projects.

In all these studies, the Department is represented by a team composed of technical specialists of the Soil Conservation Service, Forest Service, and the Economic Research Service. Other agencies of the Department participate as problems dictate on a case-by-case basis. USDA participation is coordinated by a field advisory committee representing the three agencies and chaired by SCS.

Departmental participation

Investigations and analysis are made by a river basin staff made up of a staff leader, economists, engineers, hydrologists, geologists, and sometimes soil scientists and soil conservationists. The size and actual composition of the staff depend on the nature of the study.

Type I and type II studies usually take from 3 to 5 years. Type IV studies usually take 3 to 4 years, although special studies may extend over longer periods of time.

In all cases the final objective of the USDA team is to determine how, where, and when departmental project-type programs can be used effectively to meet the needs for water-related goods and services in a river basin and to assure that agricultural interests are identified and protected in any overall water- and related land-resource development program.

Watershed projects

In the framework (type I) studies, the team identifies those river basins where upstream watershed projects can make a significant contribution toward meeting the needs of the region.

In detailed and cooperative studies, it determines which watersheds could be developed into feasible upstream watershed projects and further identifies those that need to be started within the next 10 to 15 years to meet local needs. These investigations also identify other opportunities to meet needs for recreation, municipal and industrial water supply, and water storage for pollution abatement through low flow regulation.

River basin investigations also identify watersheds that have little or no possibility as upstream watershed projects. This information can keep local people from developing false hopes and spending money in anticipation of a project that is not economically feasible.

Local and State agencies can benefit materially from the results of these studies. Local people can be made aware of opportunities to alleviate their problems, can utilize the studies for guidance in submitting applications for planning assistance, and can be guided as to purposes which should be included in a watershed work plan.

River basin studies provide a means of informing local and State agencies of the broad concepts of water- and related land-resource development and of building local leadership in this field. ♦

National Conservation Field Day

A feature of the 1966 National Conservation Field Days and Plowing Contest at Jefferson, Iowa, was a 90-minute conservation tour. Tractor-drawn wagons carried interested spectators to points of interest. Here, John Wilson, work unit conservationist, describes a pasture-renovation project while his audience views the results. ♦

Improved Land Grading Gives Complete Water Control

By K. V. Stewart, Jr.
State Conservation Engineer, SCS, Alexandria, La.

CAREFUL land grading on land needing drainage at one season and irrigation at another is giving soil conservation district cooperators in Louisiana complete water control and greater efficiency.

The elimination of small fields makes possible the use of large equipment, and water can be removed with minimum erosion when necessary; or it can be applied to crops when needed.

The Soil Conservation Service recommends eliminating 50 to 75 percent of old contour levees on most ricefields and realining the remaining levees to follow straight lines or smooth curves.

Water leveling, a special technique of land grading introduced several years ago by the Louisiana Rice Experiment Station at Crowley, has gained favor with many soil conservation district cooperators in the Gulf Coast Prairie of southwest Louisiana where rice is an important crop.

In using this method, the farmer plows the land, floods the field, and, with farm tractors and scrapers, moves soil from high places to low ones until water stands at an even or nearly even depth between levees. A natural hardpan supports tractors in the flooded field and prevents bogging.

District cooperators now using various land-leveling methods can vouch for their value in the installation of complete water-management systems on Louisiana bottom land.

Take, for example, the Hollybrook Land Company, near Lake Providence, which is moving a half million cubic yards of earth to grade its land. In one area, grading created one 210-acre field where there had been 11 fields before. Manager Jack Hamilton says the work will pay for itself in 3 years. More than 425,000 yards of earth have already been moved, part of it at the rate of 1,500 cubic yards an acre.

On the Hollybrook Plantation, owned by the Amacker family, the principal products are cattle, corn, cotton, and soybeans.

Surface ditches, to get rid of surplus water, were once considered all that was necessary. As with most such systems, the ditches were often crooked and left small odd-sized areas that were difficult to manage. Other shallow ditches, constructed across the rows to facilitate drainage, were hard to cross with farm machinery.

Manager Hamilton, a graduate of Louisiana State University, studied new systems being installed on other farms. One of the better systems involved grading the land surface to eliminate the ridges and filling the low areas that trap water. With the grading, the farmer constructs a rectangular system of surface ditches and lays out his crop rows parallel with the lateral ditches.

Soil conservationists design the grades to remove surface water in time to avoid crop damage but flat enough to prevent erosion. The survey provides essential information for planning the water-management system. Often it is possible to locate surface field ditches where changes in soil occur, making each field unit of similar soils.

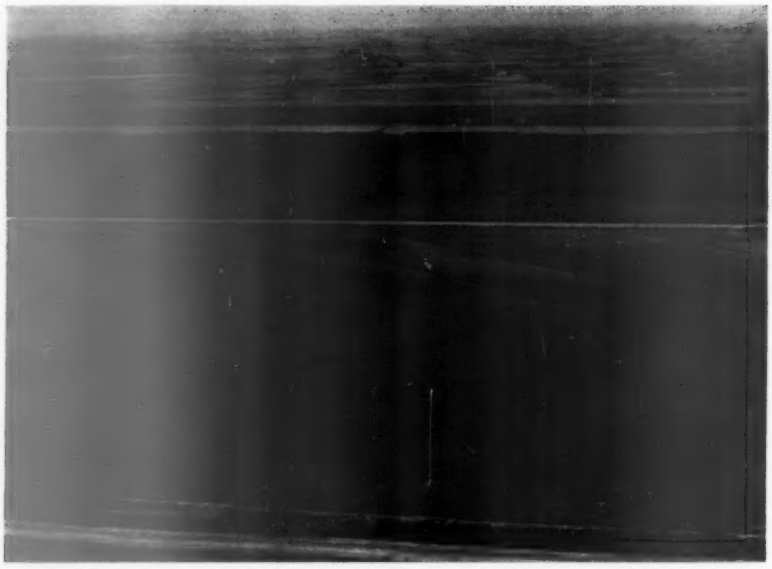
When the job is done properly, it not only provides for efficient removal of surplus water; it prepares the field for irrigation.

Although there is no irrigation on the Hollybrook Plantation, Robert Amacker, one of the owners, says they are making plans to irrigate next year.

"To land grade and square up the field for complete water management—both drainage and irrigation—is the only way to farm," said Amacker.

The goal of this Mississippi

Shallow water over a ricefield shows up the high spots which are then eliminated by the operator. This method of land leveling is gaining popularity.



Precision land grading on this 59-acre ricefield moved 426 cubic yards an acre, built parallel levees, and created an irrigation fall of 0.15 foot a 100 feet.

River bottom-land plantation is complete water management. Simple drainage isn't enough on this farm and on 8 million acres of river bottom, terrace, and Gulf Coast Prairie flat farmlands in Louisiana. It is only half a loaf in the bread and butter management of such land in this day of large farm machinery and narrow margins between costs and returns.

Similar results were obtained by the water-leveling method by Harry Aquillard, rice and cattle farmer of Basile in the Grand Coteau Ridge Soil and Water Conservation District. He reduced labor costs of flooding ricefields by 50 percent or more.

"I now use two men where five were formerly needed," said Aquillard. "I save 25 to 30 percent of the water that I once used, and I get a better stand of rice. Better water control results in better yields."

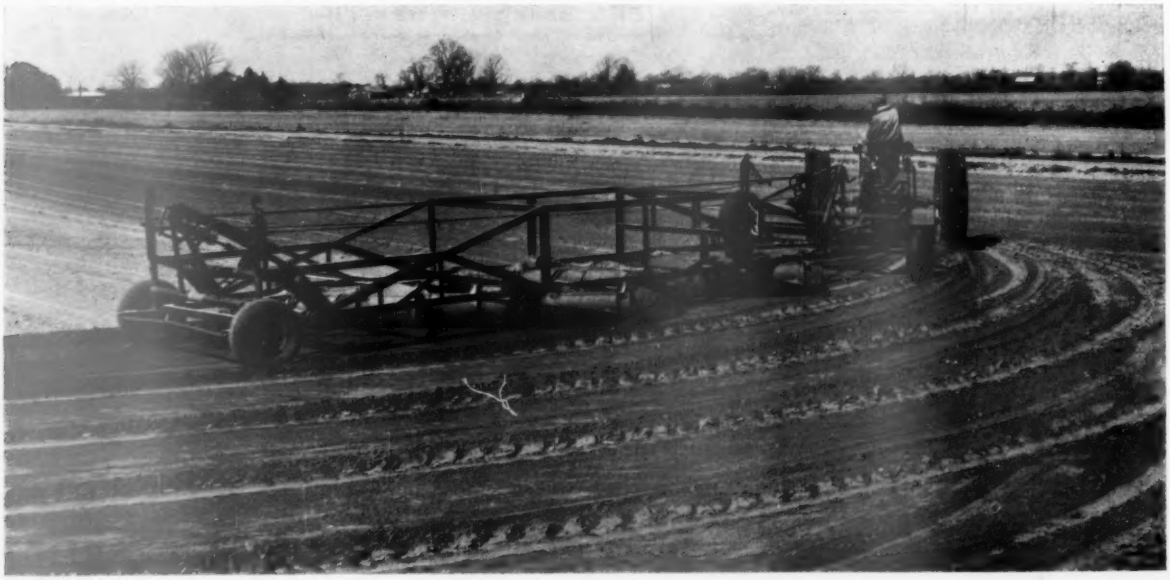
His levees are in grass and do not break following heavy rains. The grass holds down weeds which formerly infiltrated into the rice.

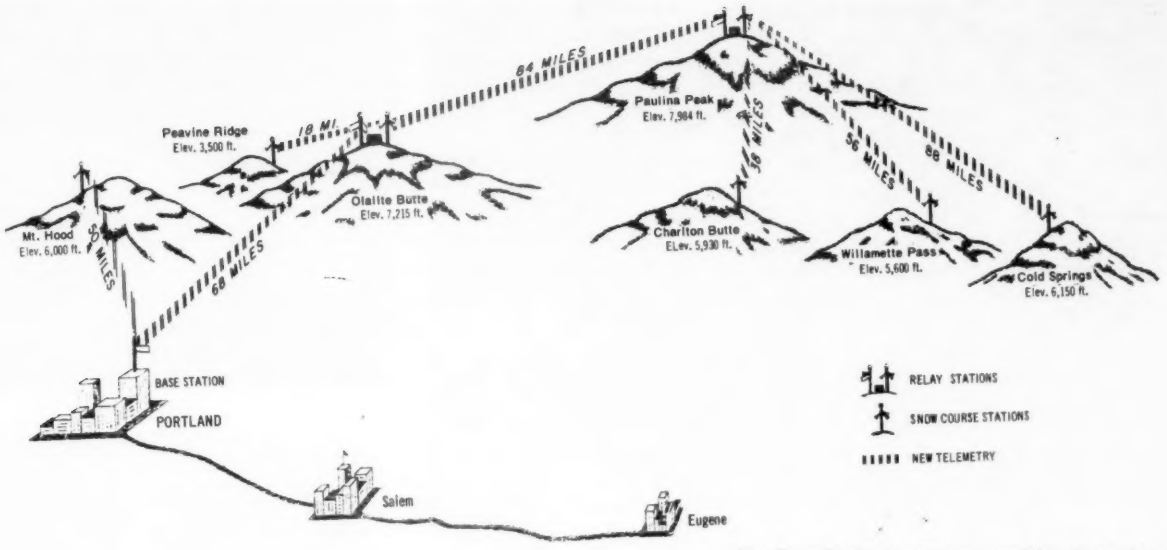
J. A. (Pete) DeKeyzer, chairman of the Lower West Red River Soil and Water Conservation District, is installing a complete water-management system on his farm in the Bayou Rapides Watershed Project near Alexandria. His system includes land grading, surface drainage ditches, main underground irrigation pipelines and portable gated pipe, and the necessary erosion-control structures.

With a modernized water-management system he says, "I will be able to farm like I have always wanted to."

And so the story goes all across Louisiana as conservation district cooperators are discarding old and inefficient methods of water control for up-to-date systems of water management. They are no longer satisfied with a half a loaf. ♦

A landplane finishes up a grading job in the Lower West Red River Soil and Water Conservation District.





The Cascade Range snow survey telemetry system.

Electronic Methods of Snow Surveying

By William G. Shannon
Chief, Water Supply Forecasting Branch, SCS

A SOIL conservation technician sitting in an office in Portland, Oreg., can tell you whether it has snowed in the past hour, what the air temperature is, and how much water is in the snowpack on Mt. Hood 50 miles away. The information comes automatically by radio every hour from a snow course on the mountain.

With new equipment now being installed at other points in the Cascade mountains, the SCS Water Supply Forecasting Office in Portland will be kept currently posted on these and other conditions at strategic points as far away as Cold Springs, Oreg., a distance of 240 miles.

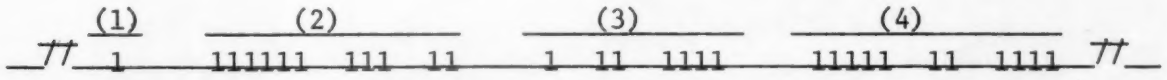
The readings of basic data are made automatically by instruments installed at the observation points, automatically encoded and transmitted by radio, and decoded at the base station.

To find a way to obtain water-supply forecast information directly from the high mountains, SCS established a testing site several years ago on Mt. Hood. Here a variety of sensoring devices and telemetry components were installed and tested. The system now in operation provides several channels of information automatically by radio to the base station.

The readout is in digital form printed on tape. Local recorders on the mountain make a continuous record of all sensors under study.

By observing the printout on the tape, the office staff can tell at any time what is happening on the mountain. If it is snowing, the tape will show an increase in water content; if the snow is melting, there will be a decrease. Air temperature is also reported so that changes in temperature can be noted. Other parameters, such as wind movement, solar radiation, soil moisture, and soil temperature, also can be collected. All of this information assists the forecaster in understanding the relationships between these factors and the runoff.

The device presently being tested to determine the water equivalent of snow is a rubber or rubber-



MARCH 3 8:28 PM '66

Typical information printed on a tape by the readout device is translated as follows: (1) Code number for Mt. Hood station, (2) 63.2 inches of precipitation, (3) 12.4 degrees of air temperature, (4) 52.4 inches water equivalent in the snow cover.

impregnated fabric pillow. Other materials can be used.

A solution of antifreeze is put into the pillow. The ground is leveled at the data-collection site so that the pillow will lie flat. A pressure hose is attached, and as the snow accumulates, the weight exerts a pressure. The change in pressure is proportional to the increase in inches of water accumulation on the pillow.

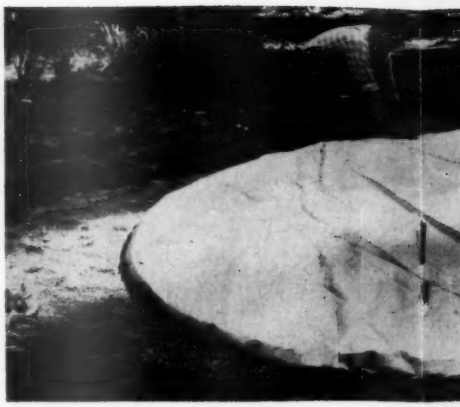
Experimentation with different sizes and shapes shows that a 6-foot pillow having a round or polygonal shape provides good results in shallow to medium depths of snow. In the heavy snow areas and where quick response to snowfall is required, a larger pillow gives better results.

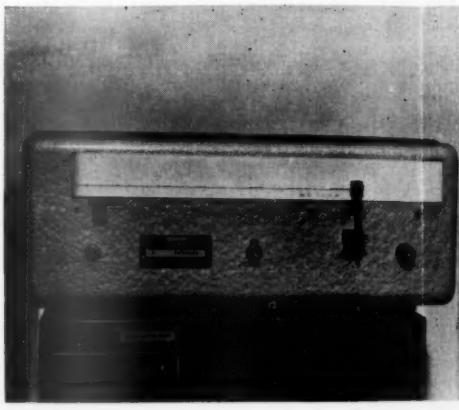
A completely automatic collection and telemetry system, of course, is complex. This complexity is compounded by severe weather and temperature conditions and the need for a power source at the remote mountain sites. The system also has to be reliable, easy to maintain, and low in cost.

The Soil Conservation Service operates, by telemetry, segments of a network in several States. The equipment used in the operation represents prototypes of several systems. These have been developed and installed under agreements and contracts with commercial companies and universities. Sufficient experience and operational records have been obtained to begin selection of a particular system and mode of operation to most fully satisfy the needs for collecting snow and related data.

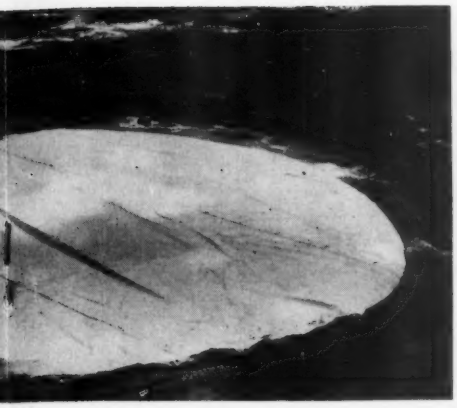
The Service plans to have in operation, for the 1967 snow season, the system which is illustrated in the accompanying sketch.

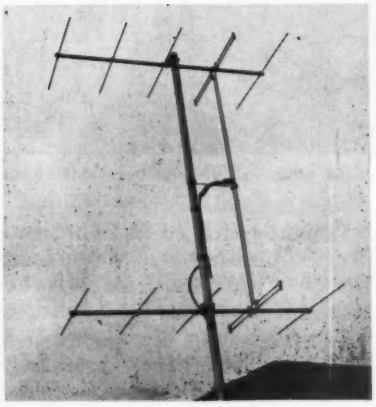
This installation will collect data from key snow-course locations along the Cascade Range in Oregon. Data can be collected at any time interval which is pre-set at the base station. The snow courses

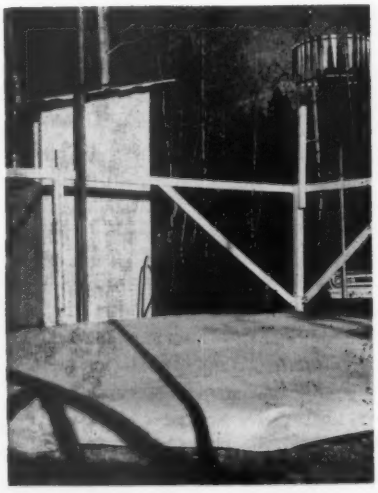




A 12-foot-diameter snow pillow (above) being installed at the Mt. Hood, Oreg., test site is positioned on a smooth base. At the base station, a readout device (left center) indicates the water equivalent of the snow by a sequence of marks on the tape. The antenna (right center) at the base station receives data from the Mt. Hood experimental site and other snow courses in Oregon.







Laborious manual measurements of snow on remote courses (upper right) will be replaced by continuous automatic data collection at stations such as the one at Garden City Summit, Utah (lower).

can be interrogated in sequence or on a selected basis if desired.

The incoming information will be printed on a hand copy and punched on tape. The tape can be processed through computer equipment for tabulation and computations. This will eliminate the need for manual processing.

Other SCS telemetry systems operating in Montana and Idaho provide information to base stations where it is transcribed by a recorder onto a chart. The information is then taken from the chart by observation and processed manually.

SCS has an agreement with the Bureau of Reclamation to undertake the measurement of snow accumulation in the Park Range area near Steamboat Springs, Colo., in connection with the Bureau's Atmospheric Water Resources Program. That network has 21 snow courses. Twelve courses are located along the Continental Divide. Six of the key stations will be equipped with pressure pillows, onsite recorders, and radio telemetry equipment. Data will be transmitted via a repeater station to the base station located in Steamboat Springs. This system will be in full operation during the 1967 snow season.

The new electronic methods should prove helpful in obtaining more frequent information, additional parameters, and better coverage of the more remote mountain areas. ♦

Camping-Fishing Area Solves Trespass Problem

FISHERMEN en route to the Boulder River for angling were a problem for Duane Hooper on his farm 3 miles south of Big Timber, Mont. They consistently went across his front yard.

Hooper solved the problem and capitalized on his location on the river which flows past his farmstead. He installed the Spring Creek camping area.

Hooper also had visions of fish ponds where those who were unsuccessful in the river could catch and take home a presentable creel of fish.

In January 1963, he contacted the Sweet Grass County Soil Conservation District for assistance. Planning was started immediately, and construction of the ponds began in the spring.

Three ponds creating 2 acres of fishing waters were planned and built in the spring, one to hold the "trophy" trout.

After the ponds were completed, the camping areas were developed: Parking areas, picnic tables, fireplaces, electricity, and restroom facilities.

On May 19, when the regular fishing season opened, Duane Hooper had his commercial fish and license, his ponds stocked with 6,000 legal-sized fish, and was ready for business. The first day of the season he sold more than 100 fish, on a per-inch basis.

The number of fishermen willing to pay for fishing was a surprise to planners as well as to Hooper. There was no other fishing enterprise close by to judge the interest of fishermen who might pay for what they caught in this fabulous angling country where fishing was always "for free."

During the first year, more than 500 people camped at Spring Creek Campground. Most of the fish sold were to nonresidents—tourists traveling through the State who would rather pay for the trout they caught than buy a nonresident license. When fishing in the river, they had to take their chances.

Duane Hooper's commercial fish pond and combined office and store built as part of an income-producing recreation enterprise.

During the next winter, Hooper improved the campgrounds, putting in showers and a sewerage system for self-contained camping trailers. He also installed an office where he sells fishing tackle, bait, candy, ice cream, ice, and other fisherman and camper needs. A "gimmick" was installed where the kids can secure either a penny or a nickel's worth of food, and then feed the fish.

The 1964 season brought more than 5,000 people from 33 States and 3 foreign countries to the campgrounds. Further improvements were made in 1964, and more than 8,000 people camped at Spring Creek Campground in 1965.

To make further use of the water and ponds, 20,000 4-inch fish were purchased in the fall of 1964. These were raised to catchable size for the 1965 season and were available to customers for stocking private ponds.

Preparing for the 1966 season, Hooper purchased 23,000 4-inch fish and had those for sale as "catchables" to stock other ponds.

This recreation area is serving a need for many campers desiring an overnight or longer camping place and a place for tourists to catch fish without the need of a nonresident license. Most people stop because of signs placed along the highway on both sides of Big Timber. The purchases of 8,000 campers requiring groceries, gas, and other daily necessities are sizable expenditures in the town of Big Timber.—LOUIS M. MOOS, *Biologist, SCS, Bozeman, Mont.* ♦

Fewer Acres Burned by Forest Fires

Acreage burned by forest fires hit an all-time low in 1965, although number of fires decreased only slightly. A total of 2,652,842 acres, an area about twice the size of Delaware, burned, according to the U. S. Forest Service. This figure is a reduction of almost 37 percent from 1964 and is 383,377 acres less than the previous low in 1961. ♦

What About Farm Drainage?

By **Gladwin E. Young,** *Associate Administrator, SCS*

FOR MANY YEARS I have had a hand in problems of agricultural drainage in the Department of Agriculture.

Almost 50 years ago, as an Indiana farm boy, I dug the ditch and laid the last 20 rods of draintile that completed the drainage on my father's farm. My father used to tell me that the value of crops lost before that ditch was installed was enough to send me to school.

In those days, the same as now, a farmer couldn't afford to lose a crop by having it drown out.

Purposes of drainage

In recent years drainage of farmlands has become a controversial issue between waterfowl hunters and farmers. The Soil Conservation Service is involved because of the assigned responsibilities to assist land owners and operators make productive use of land and water resources.

The facts about agricultural drainage show that mostly it has been good—but not always so. Drainage is one of the creative technologies of American farmers that have made American agriculture the most efficient and productive in the world.

I am afraid most people in America do not realize how important this is. A productive and efficient agriculture is the real foundation for economic growth and strength in this country or in any other nation.

We have been experiencing abundant low-cost food in this country for a long time. This cheap food era will not last forever.

The attitude that productive farmland is surplus to the Nation's needs is due for a change. At the Pan American Soil Conservation Congress in Brazil, Secretary Freeman sounded this warning:

"The greatest single challenge the world faces today is whether the swelling ranks of mankind can produce enough food to sustain life without hunger."

We have about 457 million acres of cropland in the United States. About one-third, or about 150 million acres, is drained to make it fully productive. Only about 50 or 60 million acres of our present cropland was originally swampland.

Most of the farm drainage has been installed to remove excess water during wet seasons. Some investments in drainage enterprises did not pay off because of poor soils, bad engineering, or costly speculation. And wildlife values were lost or radically changed with the drainage of swamps.

On the other side of the scale, of course, drainage of swamps permitted settlement of some of the most productive and valuable land in the country.

By 1930 about 80 percent of the land now in drainage projects was already drained. The projects were installed under State drainage laws.

Federal assistance

Prior to the Public Works Program of the 1930's the Federal Government had not participated in direct land drainage except to provide research results and limited technical advice. Since then the Congress has authorized drainage assistance as an interrelated part of the nationwide program of water-resource development. The Departments of Agriculture, Army, and Interior all include drainage as an integral part of water- and related land-resource projects.

It is estimated that 20 million acres of wetland can still be developed as farmland. Roughly 7 million acres of this is found in the bottom lands of the Mississippi River in Arkansas, Mississippi, and Louisiana. Another 7 or 8 million acres is scattered in the Coastal Plains of the Southeast.

At least 75 million acres of undrained wetland in the United States is not suited for farming but should be used for wildlife, hardwood timber, and recreation.

A public concern

The Soil Conservation Service believes that it is important that technical assistance be continued for those seeking to rehabilitate old drainage systems. It is also important that those seeking to install new drainage should seek professional advice from wildlife biologists, soil scientists, and agricultural engineers.

The fact that not all wetlands would be productive farmlands if they were drained makes selection of land and design of drainage systems important public concerns. Drainage that brings new land into crop production is not now in the public interest, therefore it continues to be the policy of the Department of Agriculture that public funds shall not to be used to provide assistance for this purpose.

Draining poor land or improper drainage installations results in losses to individuals and to public values as well. Wildlife habitat can be ruined with no offsetting gain.

For many private owners, income from wildlife can offer greater net gain than agricultural uses. This is a potential use of land that needs greater promotion by soil conservation districts and the SCS professional staff.

Value to wildlife

Drainage is not always detrimental to wildlife production. This has been demonstrated many times in the management of wildlife refuges. Drainage is necessary to make it possible to have water at the right place at the right time. This is as important to wildlife managers as it is to farmers.

Rehabilitation of some existing drainage systems will no doubt go on and should go forward to prevent waste and loss to individuals and communities. Some drainage of land not now developed will probably be inevitable. But in terms of the net acreage, drainage projects in the next decade or so are not likely to go very much above the 102 million acres shown in the censuses of 1960 and 1950. It is my prediction that about as much area will go out of drainage as is brought in.

If this is true, there will continue to be some differences of judgments and interests about what lands should be drained. But we have substantial demonstrations that reasonable solutions to conflicts can be found by reasonable men.

Farmers on whose land wildlife feeds and nests should find compensation from those of us who like to hunt. Not enough ingenuity has yet been used to find workable systems that must inevitably be found to increase productive wildlife habitat. We must have efficient farming and we need wildlife. They can exist side-by-side if we apply the skills and information now available.

Reasonable solutions

The policies and programs now in force in the prairie pothole country, I think, are good examples of working toward reasonable solutions. There has been a controversy that seemed to brand everyone who spoke in favor of ducks as being against farmers, and those who spoke in favor of farmers as being enemies of ducks.

That situation has now been improved by action of Congress that provided cash benefits to farmers through Federal purchase or lease of wetlands and at the same time made drainage ineligible for cost-sharing under certain circumstances.

These actions, while helpful, are not likely to make an immediate difference in waterfowl numbers. The reason is that the variation in production of ducks, like other farm crops in the prairie pothole region, is affected more by rainfall than by any other factor.

Discontinuing drainage will not stabilize the waterfowl population. This has been established by data collected by the Bureau of Sport Fisheries and Wildlife and is recognized by the International Migratory Bird Committee.

Wildlife technology

The technologies of farming have been developed to minimize the hazards of weather—to have water at the right place at the right time. Drainage, irrigation, farm ponds, terracing, and watershed projects are a few such practices. Similar principles of land and water management for wildlife are going to have to be found and applied.

Management of resources has been necessary because nature without the stewardship and ingenuity of man has rarely been productive enough to support mankind.

Beef cattle produce more meat from the range than did the buffalo. Farm ponds are producing more fishing per acre-foot of water than natural waters. Managed forest lands produce more wood products than unmanaged lands. Crop yields per acre are now increasing at the rate of 25 percent in a decade—all because man has directed his mind and investments to attaining these results.

This raises a question of what could be expected from wildlife if the same ingenuity and technology were directed toward adaptation of wild species to new habitats and the modification of habitat to adaptable species. New ways need to be found to increase yields of wildlife comparable to yields of other products of land and water.

Part of the answers to these questions are already available from wildlife research and wildlife managers. But it seems to me that those responsible for professional leadership in natural resources should do even more to help the general public to understand that plentiful wildlife is not going to result merely from leaving nature alone.

Leaving nature alone would not have provided ringneck pheasant shooting. It wouldn't have brought back wild turkeys and deer where they had not been for generations. It won't put water where we need it when we need it. I am sure it would not feed a Nation of 195 million people.

There needs to be a positive program of water and land management for waterfowl the same as there needs to be a positive water and land management program for agriculture.

Summary

Agricultural drainage is one of the technologies that, when properly used with other practices, has made America's agriculture productive and efficient. While some additional drainage will no doubt take place, other drainage projects may be abandoned so that the prospect is for no great net expansion in drained areas in the immediate years ahead.

A program of "no drainage" is not adequate to assure stability of waterfowl populations. A positive program of water management for wildlife is needed just as it is necessary for agricultural production. A program that will give greater participation of landowners in benefits from wildlife is imperative.

There is a continuing need for professional assistance from engi-

neers, soil scientists, and wildlife biologists to guide those who make decisions about investments in new drainage—but particularly in rehabilitation and maintenance of the 100 million acres in old drainage projects. Individuals who own land will continue to make the decisions, but the public has a stake in them.

While farm surpluses are shrinking and food is taking on new dimensions in the light of our own growing population, and in the light of aid to developing nations, we still have land enough to meet the foreseeable needs. At the same time, we have land and water enough so we can afford to devote substantial areas to wildlife and recreation. But we can afford this only if we continue to improve and apply more science and technologies to resource management. ♦

Stripcropping Pleases Farmers

"IT IS conservation farming, free, with dividends," according to Leo Simpson, chairman of the Christian County Soil Conservation District near the Kentucky-Tennessee State line.

He is speaking of contour stripcropping, which in the past 10 years has become a popular conservation practice.

The county's first contour stripcropping took shape on a 426-acre farm owned by John Knight. His conservation farm plan, prepared in 1955, included 200 acres of stripcropping and 7 acres of grassed waterways.

This was the beginning of a new era of farming in Christian County—the largest agricultural county in Kentucky.

In 1965, 8,691 acres were stripcropped, according to Ray Hutchens, SCS work unit conservationist. About 1,000 acres are being added annually.—WILLIAM C. LOWRY, *Soil Conservationist, SCS, Madisonville, Ky.* ♦

"Grass Gages" Give Ranchers Clues to Proper Grazing Rates

"GRASS GAGES" are what ranchers of the Eldorado-Divide Soil and Water Conservation District in Texas call the movable wire cages SCS range conservationists have shown them how to install in their pastures.

The cages serve to protect small plots of range grass from grazing, enabling the rancher to see how much growth has been made during the season and adjust the stocking of pastures to match forage production.

"They substitute facts for opinion," says T. R. Spence, a cooperator who pioneered their use. "I want one or two in every pasture."

The cages are made of a piece of net wire about 15 feet long. The ends of a piece are tied together and the top is folded in or covered with another short panel of wire. The cages are placed on key range sites or areas in each pasture, generally near roads where they are readily observed. A can or stick is tied on top so they can be easily spotted from a distance.

Conservation of rangeland is achieved primarily by managing the amount and time of grazing so that range vegetation can improve. Wire cages are a visual aid to help stockmen learn the facts about forage plant growth.

Some of the items which the rancher and conservationist can observe and study together more effectively where cages are used are: (1) Ungrazed plants useful as a standard for comparison of grazed plants on the site; (2) the length of leaf growth and number of seed stalks produced; (3) accumulation of mulch; (4) evidence of spread or increase of the better species; (5) depth of moisture penetration in the soil; (6) preferences of livestock for different plants; (7) evidences of soil erosion and control. A close study of these items generally helps the rancher to make management decisions with clarity of purpose and understanding.

Usually two cages are placed on the key site or area in each pasture. One cage can be left in the same place for more than 1 year, and the other moved occasionally to give short-term samples of growth—WILLIAM M. ROUNTREE, CURTIS J. FAWCETT, AND LLOYD B. JOHNSON, *Work Unit Conservationist, SCS, Eldorado; Range Conservationist, SCS, Laredo, and Soil Conservation Technician, SCS, Eldorado, Tex.* ♦

Ranchman Peyton Cain and SCS Conservationist Bill Rountree study the facts together with the help of a "grass gage."

Eight More RC&D Projects Approved

ECONOMIC development in communities of Tennessee, Mississippi, Illinois, Louisiana, New York, South Carolina, Texas, and Utah will be accelerated through Federal assistance, recently authorized by the Secretary of Agriculture, to local sponsors of the Resource Conservation and Development projects.

The 8 new RC&D projects bring to 26 the total number authorized for assistance in operations.

Southeast Delta, Miss.

Sponsored by the Humphreys, Leflore, Sunflower, Carroll, Holmes, and Yazoo County soil and water conservation districts, as well as the Big Sand Creek District and other organizations, the Southeast Delta RC&D Project occupies 1,474,166 acres.

It plans to prevent floods; improve irrigation water use, drainage, and woodland management; develop recreational resources; improve rural housing; renovate land damaged by sediment; provide conservation treatment of farmlands; and accelerate technical assistance.

Proposed measures include improvement of navigation on the Yazoo River; sewage treatment at Tchula, Belzoni, Schlater, Morgan City, and Drew; garbage disposal and improved streets at Tchula; park developments at Tchula and Minter City; a tourist potential survey for Humphreys County; a comprehensive development plan for Isola; industrial park developments at Belzoni and Drew; an industrial potential study and a beautification project at Belzoni; and an airport development.

The project measures are expected to deliver an economic impact yielding several million dollars of additional income annually throughout the 10-year installation period, creating thousands of new jobs to further enhance the well-being of the local economy.

Hull-York Lakeland, Tenn.

Located in Clay, Dekalb, Fentress, Jackson, Macon, Overton, Pickett, Putnam, Smith, White, and Cumberland counties, the Hull-York Lakeland RC&D Project covers 2,578,480 acres. It is sponsored by the soil conservation districts and other organizations in the 11 counties.

Some of the objectives are to accelerate land use and treatment; install community- and group-type improvements for flood prevention, sediment control, and agricultural water management; improve management and use of privately owned woodland; establish and improve public and private recreational developments; encourage the building of a pulp mill and factories; improve and strengthen family farms and community services; expand processing and marketing of selected mineral resources; expand and improve the system of primary and secondary highways and roads; and improve and expand community facilities —water supply, sewage, and others.

Shawnee, Ill.

The Shawnee RC&D Project covers 2,596,000 acres in Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Pulaski, Saline, Union, and Williamson counties plus parts of Franklin, Hamilton, and White counties and is sponsored by the soil and water conservation districts and other organizations of these counties.

Some of the problems are bottomland flooding, severe domestic and agricultural water deficiences, and stream pollution.

The plan is to convert 100,000 acres of steep cropland to pasture, woodland, wildlife, and recreation; develop and coordinate small watershed projects; accelerate soil survey operations; develop recreation potential; initiate research projects on stream pollution; and upgrade basic forest resources.

Bossier-Webster, La.

Covering 11,540,000 acres in Bossier and Webster parishes, the Bossier-Webster RC&D Project is sponsored by the Dorcheat Soil and Water Conservation District and the Bossier and Webster Parish police juries.

Numerous changes in land use, farming conditions, population growth and shifts, additional needs for land and water, and economic and social conditions are some of the problems.

The plan is to accelerate soil surveys and conservation planning; improve forest management; develop adequate water supplies for all purposes; accelerate wildlife development; develop recreation potential; and establish a canning and processing plant.

South Central, N. Y.

Located in the counties of Broome, Chenango, Cortland, Delaware, Madison, Otsego, and Tioga, the South Central RC&D Project is sponsored by the seven soil and water conservation districts and seven county boards of supervisors. It is 3,702,470 acres in area.

Problems of water management, water quality, water storage, and flood control are being aggravated by increasing population and rapid changes in land use. Farm incomes are low.

It is proposed to intensify and coordinate both immediate and long range land use planning; fully develop and utilize water resources; accelerate land conservation treat-

ment to reduce erosion, flooding, and sedimentation; provide job training opportunities; and complete soil surveys for the area.

Lowcountry, S. C.

Encompassing an area of 3,143,680 acres in Beaufort, Berkeley, Charleston, Colleton, Dorchester, and Jasper counties, the Lowcountry Area RC&D Project is sponsored by five soil and water conservation districts and other organizations.

Health problems are acute, the majority of rural homes lack running water, and the low terrain and heavy rainfall contribute to problems of flooding, water management, and water control.

Among the proposals are the encouragement of adequate size family agricultural units; acceleration of needed conservation measures; provision of proper and adequate water control; promotion of recreation and tourist developments; and improvement of management of the area's woodlands.

Southeast Texas

The Southeast Texas RC&D Project covers 5,233,000 acres in Orange, Jasper, Newton, Jefferson, Hardin, Tyler, Polk, and Chambers counties and parts of Liberty and San Jacinto counties.

Eight soil conservation districts and other organizations sponsored the project.

It is planned to improve land use and treatment; diversify farm enterprises; coordinate efforts in developing natural resource use; develop potential for both public and private outdoor recreation areas; and accelerate soil survey operations.

Box Elder, Utah

The Box Elder RC&D Project has an area of 3,474,696 acres and is sponsored by three soil conservation districts and other organizations in Box Elder County.

Major problems include irrigation water shortages and water losses, flood damage, lack of marketing facilities, and job opportunities.

Some of the proposals are to conduct a complete soil survey; develop irrigation water-storage facilities; improve irrigation water-conveyance systems; accelerate needed conservation measures on farms and ranches; develop small income-producing recreation areas; and halt flooding. ♦

FFA Members in Contest

FORTY-FIVE Negro FFA chapter members competed last spring in the Area VI land-judging contest at Mt. Pleasant, Tex., sponsored by the Sulphur-Cypress Soil and Water Conservation District. Not only was this the first year Negroes competed in the annual contests, but it also was the biggest contest ever held in the district.

District officials thought the contest an outstanding success. Of the top 5 teams competing, 4 later placed in the top 5 in Texas, and 2 finished in the top 10 at the International Contest at Oklahoma City.

"Although there were no Negroes on the top five teams, the Negro contestants learned a lot in competing against such top flight, experienced competition," reports Rayburn Nash, area conservationist, SCS, Mt. Pleasant. "Just think—2 of the top 10 teams in the Nation competed here. We're expecting the Negro members to be in the thick of the contest from now on."

Credit for part of the contest's success goes to Miles I. Hall, then a soil scientist, and Irvin Musgrove, Negro soil conservationist. They contacted all FFA advisers several years ago, offering to help with land-judging training. Additional training of teachers and coaches this year is expected to help them produce winners in the future. ♦

Some of the contestants at the land-judging contest at Mt. Pleasant, Tex.

CONSERVATION PROFILE

Ray Hecksel

Minnesota

Conservationist's farm "viewed" by thousands

SAY WHAT YOU WILL, conservation sells best when you can see it on the land. The neighbors of Ray Hecksel, Watertown, Minn., farmer, have appreciated this fact for years.

Almost as good as being there, though, is an aerial photo overlooking Oak Lake on Hecksel's farm that is making an impact on hundreds of thousands of admiring viewers.

In 1960, Erwin Cole, SCS photographer, took an aerial photo of the contour strips on the farm. This picture later represented Minnesota in the "Water for America" exhibit, and an earlier view of the Hecksel farm was used in the National Association of Soil and Water Conservation District's 1966 Soil Stewardship booklet and in its "Heritage of a Free People" publication.

These are pictures of a farm seen by hundreds of thousands—but what about the man behind the farm, Ray Hecksel?

His story starts almost 30 years ago when in 1939 he rented this farm in Carver County.

The farm had been cropped in big, square fields for years. After each heavy rain, runoff water cut small gullies across the fields.

"I remember growing sweet corn one year when rains were heavy," Hecksel recalls. "That fall we had trouble. Wheels of the trucks dropped to their axles in the small washouts. Digging out those big, heavily loaded trucks was hard work. Grain harvests were a problem too. I carried a shovel on the binder and had to stop several times on some rounds, get the shovel out, and fill in the gullies and washouts to get the binder bullwheel across. Soil erosion was hard on the machinery as well as on me. Besides it cost money in reduced crop yields."

In spite of these problems, Ray bought the farm in 1943. During 2 of the next 4 years rains were unusually heavy, eroding the soil and developing field washouts that he couldn't cross. By 1947, Hecksel was ready to move off. Let somebody else have the troubles!

Original supervisor

But just at that time Walter Lobitz, one of the original supervisors of the Carver Soil and Water Conservation District, proposed that Ray get a group of neighboring farmers together for a meeting to discuss conservation plans and practices.

The next January Hecksel told Ed Lyons, SCS soil conservationist at Waconia, that several interested neighboring farmers planned to meet in the rural St. Peter's Lutheran Church basement near Watertown.

The night was a bad one with

Right—Ray Hecksel. Left—Aerial photo of contour strips on the Hecksel farm represented Minnesota in the "Water for America" exhibit.

a 20°-below zero temperature, high winds, and drifting snow. Because of the storm only four or five farmers attended, but Lyons explained soil conservation plans and practices to his small audience and told the farmers they could get on-farm assistance with conservation planning and application of the practices.

Erosion control

This was what Ray had been looking for. He signed a request for erosion-control help for 1948.

The next spring changes began to take place on Ray's farm. Lyons and Herb Halverson, also an SCS soil conservationist, staked out the first contour strips and surveyed the gullies to be filled, shaped, and seeded to grassed waterways. This first step would control soil erosion on slopes on the north side of the road facing Old Lake.

In October 1948, a soil conservation "face lifting" was held on Ray Hecksel's farm and on the adjoining Herb Koehler farm. It was a big affair with about 4,000 people in attendance. The rest of Ray's conservation farm plan was applied during this demonstration.

With soil erosion controlled, his production of corn, grain, and hay quickly climbed in quality and increased in quantity. Wear and tear on machinery was reduced—so was the wear and tear on Ray.

This is by no means the end of the story. Hecksel has continued to apply needed practices on his farm until it is now a top conservation farm in the community.

Recognized as a conservation leader, Ray was elected to the Carver District board of supervisors in 1950. He was re-elected twice and was board chairman until he retired in March of this year.

Ray Hecksel has practiced what he has preached. He has encouraged others to follow a good soil and water conservation program and has set an example on his own land. ♦

Thinning of this Douglas fir stand returned the owner, V. T. Haapala, $100 an acre.

Woodland Plan Brings Profit

GOOD woodland management is already paying off for V. T. Haapala, who farms near Winlock, Wash.

Haapala, cooperator of the Lewis County Soil and Water Conservation District, has netted nearly $100 an acre from timber for sawlogs, poles, and pilings that he has thinned out of part of his woodland. And this was just the first step under his woodland plan developed with SCS help.

His 310 acres of woodland includes 25- to 40-year-old Douglas fir and red alder. He divided 240 acres into six units of about 40 acres each; each year one unit is thinned and improved. He's now working on unit 1.

The other 70 woodland acres are treated separately. He will harvest red alder from two fields in the next 15 to 20 years, and then plant the fields to Douglas fir. Christmas trees will be cultured and harvested on three other fields; two fields soon will be planted to Douglas fir; and so on. The rest of the 371-acre farm is cropland.

Haapala hopes to do an increasing percentage of the harvesting himself as time goes on. In helping with the thinning so far he has realized the value of good roads and correct positioning of landings, and his plans include road straightening and widening and building of new ones.—DAVID L. HINTZ, *Forester, SCS, Chehalis, Wash.* ♦

Economic Act Helps Farmer

THE ECONOMIC Opportunity Act's College Work Study Program is not only helping worthy students through school but is making a real contribution to Maine's soil and water conservation program. Tyler Libby, University of Maine student, is a good example.

Tyler lives on a small general farm with his widowed mother, Mrs. Elsie Libby, and three brothers. Last year she helped Tyler and his older brother attend the University of Maine.

Mrs. Libby with the help of her 4 sons manages 12 small backwoods sporting camps on Millinocket, Caribou, and Chandler lakes. Mrs. Libby's gross income, less than $3,000 a year, was just not enough to meet education expenses.

Libby has to work his way through college. He overcame some of his financial difficulties by working in Maine's small watershed program.

The University of Maine under the Economic Opportunity Act sponsored Tyler and 13 other students, and the Maine Soil and Water Conservation Committee placed the students in soil and water conservation districts where they received good working experience and made a contribution in the field of conservation. SCS provided on-the-job training.

The students worked as typists, clerks, rodmen, map makers, or they generally assisted SCS personnel in engineering investigations.

Tyler helped survey watershed damsites. "Jacking" rod, chaining

distances, and staking grades were new experiences for him. Working with soil conservationists also helped in understanding the problems, needs, and programs of soil and water conservation.

Equally important, the 10 weeks of summer employment meant nearly $700 to help defray school expenses.—LAUREN H. LONG, *Assistant to State Conservationist, SCS, Orono, Maine.* ♦

Notes on Western Range Forbs, Cruciferae through Compositae. BY F. J. HERMANN. *USDA Agr. Hbk. 293. 365 pp., illus. $1.50.*

This book is the second of two parts of an account of western forbs conceived and largely carried out by the late William A. Dayton, who completed the first part, *Equisetaceae through Fumariaceae,* (Agr. Hbk. 161, 1960).

A forb is defined by the American Society of Range Management as "any herbaceous plan other than those in the Gramineae (Grass), Cyperaceae (Sedge), and Juncaceae (Rush) families."

Forbs are very important in conservation work—not only as livestock forage, but as food and forage for wildlife, for erosion control, and for their contribution to natural beauty. It is among the forb plants that we find the "posies" or wild flowers which decorate the countryside and catch the eye of our city friends.

Hermann's booklet includes line drawings and botancial information on each plant discussed. In addition, forage values and poisonous characteristics, if any, are covered. Information on general habitat, range, and other ecological notes are added.

Although written largely for ranchers, range conservationists, and land managers, the books contain much of interest to general conservationists or any lover of the outdoors. They should be on every western conservationist's bookshelf.—ROBERT E. WILLIAMS, *Head Range Conservationist, SCS.*

New Publications

A Ten-Year Program of Federal Water Resources Research. BY FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY, COMMITTEE ON WATER RESOURCES RESEARCH. *1966. Office of Science and Technology. Executive Office of the President. 88 pp. $0.40.* "On the average, for the Nation as a whole, natural water supplies are adequate to support a three-to-five-fold increase in water consumption. This assurance is scant comfort to the water utility of a drought-stricken city in the Northeast, to the farmers of the Southwest where water is perennially in short supply, or to an industrial manager who finds the water flowing by his plant so polluted that it cannot be used. Nevertheless, the fact that there is a margin for increased water use does not say that we need fear catastrophic shortages, provided we anticipate our problems and use wise management in dealing with water development."

This publication sets forth a program of research to meet anticipated water problems. The basis for long-range planing of the research program is outlined in Part One. Part Two is a discussion of 14 major problem areas and specific recommendations pertaining to them. Part Three covers current programs in 44 research subcategories and makes directional recommendations regarding each for the decade ending 1976.

Rain Traps for Intercepting and Storing Water for Livestock. BY C. W. LAURITZEN AND ARNOLD A. THAYER. *1966. USDA Agr. Inf. Bul. 307. 10 pp., illus. 10¢.* Gives details on planning. locating, preparing the site, and conconstructing a rain trap. In addition to supplying water for livestock, the rain trap can be located to control livestock distribution and thereby improve utilization and managment of grazing.

List of Published Soil Surveys. *1966. USDA, Soil Cons. Serv. 24 pp.* An up-to-date listing.

A Consumer's Guide to USDA Services. *USDA Misc. Pub. 959. Revised 1966. 49 pp., illus. 20¢.*

Light and Plants—A Series of Experiments Demonstrating Light Effects on Seed Germination, Plant Growth, and Plant Development. BY R. J. DOWNS, H. A. BORTHWICK, AND A. A. PIRINGER. *1966. USDA Misc. Pub. 879. 17 pp.* Prepared to answer inquiries from students, teachers, and other interested biologists for details of simple but dramatic experiments to demonstrate the formative effects of light on plants.

Farm Costs and Returns. *Revised 1966. USDA Agr. Inf. Bul. 230. 99 pp., illus.* Contains summary estimates of costs and returns for 1965 and earlier years on 42 important types of commercial farms in 24 major farming areas in the United States, together with a brief analysis of changes occurring in production, prices, income, and costs for each of these types of farms.

Facts for Prospective Farmers. BY KENNETH H. MYERS. *1966. USDA Farmers' Bul. 2221. 22 pp., illus. 15¢.* Supersedes Farmers' Bul. 1961. Deals chiefly with the family-managed commercial farm that is large enough for efficient operation.

Methods of Flow Frequency Analysis. *1966. Subcommittee on Hydrology. Inter-Agency Committee on Water Resources, Bul. 13. 42 pp.* Guide to present-day practices in the field of flow frequency analysis.

Beauty for America. *1965. Government Printing Office, Washington, D. C. 782 pp. $2.75.* Proceedings of the White House Conference on Natural Beauty, May 24-25, 1965.

Plant Pests of Importance to North American Agriculture. BY H. H. THORNBERRY. *1966. USDA Agr. Hbk. 307. 446 pp. $2.50.* Index of plant virus diseases.

Effect of Annual Applications of Diuron on Seed Yields of Perennial Grasses in Oregon. BY WILLIAM O. LEE. *1966. USDA Tech. Bul. 1358. 23 pp., illus.*

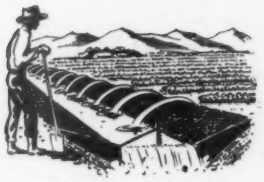
A Directory of Private Organizations Providing Assistance in Outdoor Recreation to Individuals, Organizations, Public Groups. *1966. U. S. Dept. Interior. 68 pp. 30¢.*

Soil Surveys

Clinton County, Pennsylvania. BY WALTER J. STEPUTIS, RALPH E. MATTICKS, ROBERT ZIMMERMAN, AND ROBERT HENRY. *1966. 141 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

From the Administrator:

Water Conservation and Management



AT A TIME when people are increasingly uneasy about the future of their water supplies—when water is even a topic for international discussion as a possible factor in the prospects of peace—it is well to take stock of what agriculture is doing with the water it controls.

Few people realize what a large share of the Nation's water resource is in the custody of farmers and other rural landowners.

It is common knowledge, of course, that in the irrigated sections of the West as high as 90 percent of streamflow may be used directly in agriculture. The relation of agricultural practices to the amount and quality of water available for competing uses is clear in these situations.

What is not well understood is that in other areas the rural landscape is the *source*, if not the principal consumer, of water.

The condition of the land on which rain and snow fall affects the proportions that soak into the earth immediately and that run off as surface flow. The diversions, terraces, dams, and other water-control devices that land owners use on the uplands and in the small watercourses affect the amount and rate of streamflow; they often make the difference between sudden floods and sustained water yield.

The presence or absence of adequate plant cover and erosion-control measures determines whether the water is clean or silt laden.

So the rural land owners and users are the principal custodians of our water supply, whether they be farmers or exurbanites. Their land-management practices affect us for the good or ill, whether in the dry West where most water falls on public lands in the high mountains and is used on the farms in the valleys or in the humid East where most of the water accumulates on privately owned land and is used by industries and cities.

Another fact about water that is not widely understood is that this is a resource that cannot be increased or diminished. There is only so much water; so far as we know, there always has been and always will be the same amount. Only its quality, its distribution, and the rate at which it moves downslope and downstream toward the sea or evaporates into the air can be altered by our activities.

Water conservation, then, is not a matter of creating new supplies nor of preserving what we already have; it is a matter of *managing* that which comes to us in a predictable pattern through the endless hydrologic cycle of precipitation, runoff, and evaporation. Water conservation is *efficient use* of the resource as it moves on its relentless way through the cycle.

Wise and efficient management of water begins with sound and thorough planning of major river basins.

Here the various needs for water can be identified and evaluated in relation to the available supply. Watershed-protection projects, impoundments, diversions, and other water-control measures can be planned to make the most beneficial use of the supply for all concerned.

Agriculture's interest in such broadscale planning is represented by our participation in river basin investigations under the auspices of the newly created Water Resources Council.

Small watershed projects offer further opportunity to work out specific solutions to local water problems within the framework of broad river basin plans.

On individual farms, and particularly in irrigated areas, land owners and operators can do much to protect water sources and to improve the efficiency of water use.

Soil conservation district cooperators, individually and in groups, have demonstrated that scientifically planned irrigation systems and skillful water management can reduce per-acre water requirements as much as 50 percent from previous levels.

Technical information and assistance provided by the Soil Conservation Service have been a major element in such savings of irrigation water.

One of the first requirements in the proper management of irrigation water is for the operator to know when to irrigate and how much water to apply. Solution of this problem requires a knowledge of the rooting habits of crop plants, the water-holding capacity of the soil, the rate at which plants use water, and related principles of plant physiology. Soil conservationists assisting district cooperators have been able to supply practical guides on these points.

By using water efficiently and doing a good conservation job, irrigators help their communities get maximum benefits from the water supply of each watershed.

This is no small matter, for, nationally, irrigation accounts for nearly half of total water withdrawals and 80 to 90 percent of consumptive use.

Land owners and users everywhere, whether they use water for irrigation or not, make a substantial contribution to good water management by keeping their land in favorable condition to receive and conserve the natural precipitation that recharges our current water supply.

This is water conservation.

D. A. WILLIAMS

DOCUMENTS
DEC 30 1966
MICHIGAN STATE UNIVERSITY
LIBRARY

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D. C. 20401

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U. S. GOVERNMENT PRINTING OFFICE

If your address changes, please notify us of your complet new address, including Zip Code number, and include old address with our code number as shown above.

America the Beautiful

America The Beautiful—Idaho WATER FROM MOUNTAIN SNOWMELT IRRIGATES POTATOES
JEFFERSON SOIL CONSERVATION DISTRICT

The "America the Beautiful" photo exhibit—one picture for each State, Puerto Rico, and the Virgin Islands—has been reproduced in full-color lithographs suitable for framing. Prints are available from the Superintendent of Documents for 10 cents each or $5.00 for the complete set. Order blanks can be obtained from local Soil Conservation Service offices and at most post offices.